NATIONAL STANDARDS COMMISSION

NATIONAL MEASUREMENT (PATTERNS OF INSTRUMENTS) REGULATIONS

REGULATION 9

CERTIFICATE OF APPROVAL No 10/1/8

This is to certify that an approval for use for trade has been granted in respect of the pattern and variant of the

Gilbarco Model T093D LPG Driveway Flowmeter

submitted by Gilbarco Aust. Ltd
12-38 Talavera Road
North Ryde NSW 2113.

Note: The Provisional status of this approval has now been removed.

CONDITIONS OF APPROVAL

General:

This approval is subject to review on or after 1/10/88.
This approval expires in respect of new instruments on 1/10/89.

Instruments purporting to comply with this approval shall be marked NSC No 10/1/8. Instruments currently marked P10/1/8 should be renumbered at their next verification.

This approval may be withdrawn if instruments are constructed other than as described in the drawings and specifications lodged with the Commission.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificates Nos S1/0 and/or S2/0, as appropriate.

Special:

The initial verification of each driveway flowmeter shall be carried out under the supervision of a government-licensed LPG installer or a person experienced in the design and installation of LPG systems.

Instruments installed under this approval are to be calibrated at intervals not exceeding 6 months.

Signed

J. Birch.

Executive Director

Descriptive Advice

Pattern: provisionally approved 7/9/83 - approved 25/11/87

- Gilbarco model T093D attendant-operated driveway flowmeter for dispensing liquefied petroleum gas.

...../2

Variant: provisionally approved 7/9/83 - approved 25/11/87

1. Used in self-serve mode with various Commission-approved Gilbarco consoles.

Technical Schedule No 10/1/8 describes the pattern and variant 1.

Filing Advice

Provisional Certificate of Approval No P10/1/8 dated 26/9/83 is superseded by this Certificate and may be destroyed.

The Provisional status of this approval has been removed, and any reference to Provisional or P in the approval documentation or on any instrument purporting to comply with this approval, should now be removed.

The documentation for this approval now comprises:

Certificate of Approval No 10/1/8 dated 28/12/87
Technical Schedule No 10/1/8 dated 26/9/83
Test Procedure No 10/1/8 dated 26/9/83
Figures 1 to 6 dated 26/9/83

NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No P10/1/8

Pattern: Gilbarco Model T093D LPG Driveway Flowmeter

Submittor: Gilbarco Aust. Ltd
12-38 Talavera Road
North Ryde, New South Wales, 2113.

1. Description of Pattern

The pattern is Gilbarco model T093D driveway flowmeter (Figures 1 to 3) for the delivery of liquefied petroleum gas of density 0.510 to 0.560 kg/L at 15°C, at temperatures between -5°C and 45°C. The maximum and minimum flow rates are 50 L/min and 15 L/min respectively.

The flowmeter may be fitted with a hose mast in which case it is known as a model T093B. Either model may be fitted with a "dead-man" switch.

The hydraulic diagram for the driveway flowmeter is shown in Figure 4.

Volume	999.99 L in 0.01 L increments
Unit price	999.9 c/L in 0.1c increments
Price	$999.99 in 1c increments
Totaliser volume	9999999 L in 1 L increments

1.1 Component Structure and Conditions for Installation*

The component parts of each driveway flowmeter are listed in Figure 5 and comprise those components detailed in (iii) to (xi) below.

(i) Supply Tank

The supply tank is large enough to supply liquefied petroleum gas at a rate that does not cause the pressure in the supply tank to drop to the point where vapour production occurs in the line between the supply tank and the pump. The capacity of the supply tank is such that the maximum delivery of the driveway flowmeter in one minute is not greater than approximately 2.5% of the tank capacity.

The supply tank is located higher than the pump so that the liquid level always creates sufficient pressure at the pump inlet at maximum flow rate (i.e. above the vapour pressure) to prevent vapour being formed.

(ii) Pump

The pump is positioned as close as possible to the supply tank, with short inlet connections, and having as few restrictions as possible. There are to be no restrictive fittings within ten pipe diameters of the pump inlet. The inlet pipe to the pump is larger than the outlet from the pump. The inlet line should, where possible, slope upwards towards the supply tank.

The external pump by-pass relief valve is installed in a line returning to the supply tank; this line should have no low spots which could trap liquid, and where possible should slope upwards towards the supply tank. The external by-pass setting is 100 to 140 kPa LOWER than the internal pump relief valve setting, where such a valve is fitted.

*This approval relates to the metrological performance of the metering system; inspectors are advised that the system must comply with the requirements of other statutory authorities relating to safety, handling, storage and transportation of liquefied petroleum gas.

(iii) Meter

Silea type Lux 60 4-piston liquefied petroleum gas meter. Liquid entering the meter passes a temperature compensator probe located towards the bottom of the gas purger.

(iv) Gas Purger

The meter is protected from the measurement of vapour by correct installation and by a Silea continuous-bleed gas purger which incorporates an inlet non-return valve, with soft seat and internal hydrostatic relief valve, and a strainer (Figure 6). The gas purger is vented via a line which incorporates a venturi, through a vapour return line not less than 19 mm in diameter to the vapour space in the supply tank. The vapour return line is constructed without low spots or traps which could prevent free flow of vapour in either direction.

Two thermometer pockets are situated near the bottom of the purger.

(v) Electronic Temperature Compensator

Temperature compensation is achieved by means of an electronic compensator built into the Gilbarco model CD indicator/computer unit.

The probe for the compensator is located in the gas purger. The electronic probe circuitry senses changes of temperature in the liquid, and the CD unit adjusts the indicated volume to the equivalent volume at a temperature of 15°C. A switch is provided to de-activate the temperature compensating function for testing purposes.

(vi) Driveway Flowmeter Indicator

The flowmeter indicator is a Gilbarco LPG Electroline CD module mounted in a separate housing atop the main housing, and contains all of the control switching, and computational and display componentry.

The pulse transmitter is driven from the meter output shaft through a gear assembly (on which is mounted a checking (peripheral) pulser). A sealed Weights and Measures test button is located within the module.

Unit prices may be changed either by buttons within the module or, if connected, by a control console (refer variant 1).

When the start lever is actuated, the pump motor immediately starts. There will be a delay of a few seconds, depending on the time taken to compress any vapour in the hose to liquid, before the nozzle is released; the nozzle may then be removed from its receptor and connected to the vehicle tank, during which time the reset cycle will have been completed, and delivery can commence.

(vii) Pressure Differential Valve

A Silea spring-loaded piston-type valve maintains pressure in the metering chamber to prevent the formation of vapour. A pressure-equalising pipe is connected from the differential valve to the supply tank, through the vapour return line from the gas purger (Figure 4). The differential valve is set at 100 kPa for regenerative turbine type pumps or 300 kPa for vane type pumps (i.e. 100 kPa or 300 kPa above the vapour pressure).

(viii) Outlet Piping

The pipe connection from the differential valve to the hose is fitted with an excess-flow valve and a stop valve (Figure 4).

(ix) Vapour Indicator

A sight glass and a pressure gauge are fitted in the line between the meter and the differential valve so that it may be seen if vapour is being metered (Figures 2 and 4).

(x) Hose

The dispenser is fitted with a hose (which may be supported on a hose mast in which case the flowmeter is known as a model T093B) complying with the SAA code for hoses in use with liquefied petroleum gases with a bore not exceeding 19 mm. An Elaflex model ARK 19 dry-break coupling is fitted.

(xi) Nozzle

The nozzle used is a Gilbarco model 102-ZVG 1.3, also known as an Elaflex and approved under NSC No S158. There is a small loss of liquid whenever the nozzle is released.

(xii) Pressure Equalisation

To facilitate pressure equalisation when the driveway flowmeter is being tested with a pressure prover, provision is made for a vapour line from the prover to the vapour space of the supply tank either directly or via a tee in the vapour return line from the gas purger using a 1 3/4" Acme male adapter. This provision is sealed OFF when not in use. During a normal delivery there is no vapour return connection between the receiving container and the supply tank.

1.2 Markings

The instrument data plate permanently fixed to the external housing of the driveway flowmeter is marked with the following:

Manufacturers name or mark	
Year of manufacture	
Serial number	
NSC approval number	NSC No P10/1/8
Maximum flow rate	50 L/min
Minimum flow rate	15 L/min
Liquid temperature range	-5°C to 45°C
Density for which temperature compensator is set	..... kg/L
Maximum operating pressure	2400 kPa
Approved for LPG of density 0.510 to 0.560 kg/L only	

1.3 Sealing/Verification (Figure 2)

Provision is made for a verification mark to be applied. The meter calibrator adjustments may be sealed with lead plugs.

2. Description of Variant 1

The pattern may be used with the following Commission-approved Gilbarco control consoles:

- Transac 12 (T12) - NSC Approval No 5/6A/74.
- Transac 11 (T11) - NSC Approval No 5/6A/76.
- Transac 11-5 (T11-5) - NSC Approval No 5/6A/78.

TEST PROCEDURE No P10/1/8

The following test procedure is to be followed at each reverification test. The tests are to be arranged so that one is carried out in the hotter period of each year and the other in the cooler period. One test should also be arranged when there is a low liquid level in the supply tank to ensure that there is still sufficient pressure at the inlet to the pump to avoid vapour being generated.

1. Visual Inspection

Visually inspect the complete installation to ensure that the pump, supply tank, dispenser and pipework are installed in accordance with the description given in the Technical Schedule. If the system is not installed correctly (e.g. if a restrictive valve or fitting is installed in the pipeline) vapour may be generated and will show in the sight glass when the purger does not eliminate all the vapour.

2. Meter Test With Temperature Compensator De-activated

Maximum Permissible Errors:

± 0.5% at normal flow rate.

± 1.0% at minimum flow rate.

(i) Carry out at least three runs into the prover at the normal flow rate at which the meter is used. Read the temperature and pressure at the meter and at the prover. Correct for the change in volume of the liquid due to any difference in pressure and temperature between the meter and the prover and for changes in the volume of the prover due to any difference in pressure and temperature from the reference temperature and pressure at which it was calibrated.

(ii) Repeat the above test at the minimum flow rate of the meter or 15 L/min, whichever is the greater.

(iii) During the test runs, note whether any vapour is showing in the sight glass.

3. Meter Test With Temperature Compensator Activated

Maximum Permissible Errors:

± (0.7% + 0.02% per °C difference from 15°C) at normal flow rate.

± (1.2% + 0.02% per °C difference from 15°C) at minimum flow rate.

(i) Carry out at least three runs into the prover at the normal flow rate. Read the temperature and pressure at the meter and at the prover. After correcting the prover volume reading to its calibration temperature and pressure, reduce the volume to its equivalent volume at 15°C using the temperature indicated at the meter and the appropriate table for the density of the liquid for which the meter temperature compensator is set.* Compare the calculated volume with the meter indicated volume.

(ii) Repeat the above test at the minimum flow rate of the meter or 15 L/min, whichever is the greater.

4. Computation Tests on Indicator

Carry out any additional tests detailed in the original approval documents for the control console used.

---

*ASTM-IP Petroleum Measurement Table 54 - Volume Reduction to 15°C (Metric Edition).

National Standards Commission

NOTIFICATION OF CHANGE

VARIOUS CERTIFICATES OF APPROVAL

The following changes are made to the approval documentation for various LPG flowmeter approvals as listed below:

In the approvals listed below, remove from the Certificate, Technical Schedule and Test Procedure, any Condition of Approval or clause that refers to instruments being verified, re-verified or calibrated at specific intervals. (Note that the re-verification period is determined by the Trade Measurement Authority in the State or Territory in which the instrument is located.)

APPROVAL NUMBER	PATTERN
10/1/2	Halco Neptune 32/38 mm LPG Flowmeter
P10/1/3	Acme Model LGD 100 LPG Driveway Flowmeter
10/1/3A	Acme Model LGD 105S LPG Driveway Flowmeter
P10/1/5	Batchen Model Mk II LPG Driveway Flowmeter
P10/1/6	Wayne Model ELC1 LPG Driveway Flowmeter
10/1/6A	Email Model ELC1 LPG Driveway Flowmeter
P10/1/7	Indeng Model MKO LPG Driveway Flowmeter
10/1/8	Gilbarco Model T093D LPG Driveway Flowmeter
10/1/8A	Gilbarco Model T093D LPG Driveway Flowmeter
10/1/9	Batchen Model Commander LPG Driveway Flowmeter
P10/1/10	LPG Engineering Model Stargas LPG Driveway Flowmeter
10/1/10A	LPG Engineering Model Stargas LPG Driveway Flowmeter
10/1/11	LPG Engineering Model Stargas EPSN LPG Driveway Flowmeter
10/1/12	CleverHead Model 93 LPG Driveway Flowmeter
10/1/13	Batchen Model SCB Commander LPG Driveway Flowmeter
P10/2/2	Liquid Controls Model MA-7-GY-10 Bulk LPG Flowmeter
10/2/3	Neptune Model 4D 32 mm Bulk LPG Flowmeter
P10/2/4	Euromatic Model FL 11/2-125 Turbine Bulk LPG Flowmeter

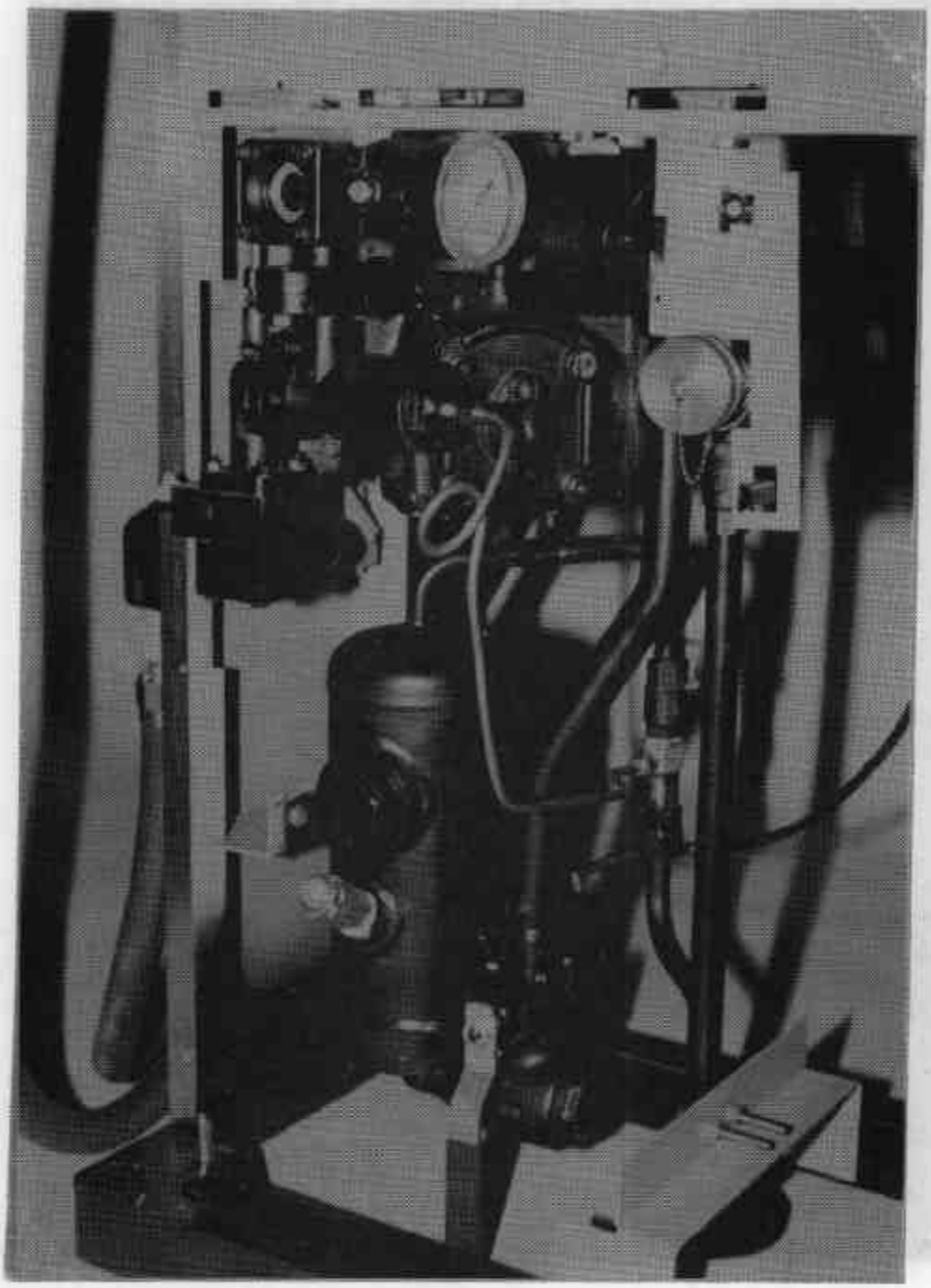
Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.

FIGURE P10/1/8 - 1

Gilbarco Model T093D LPG Driveway Flowmeter

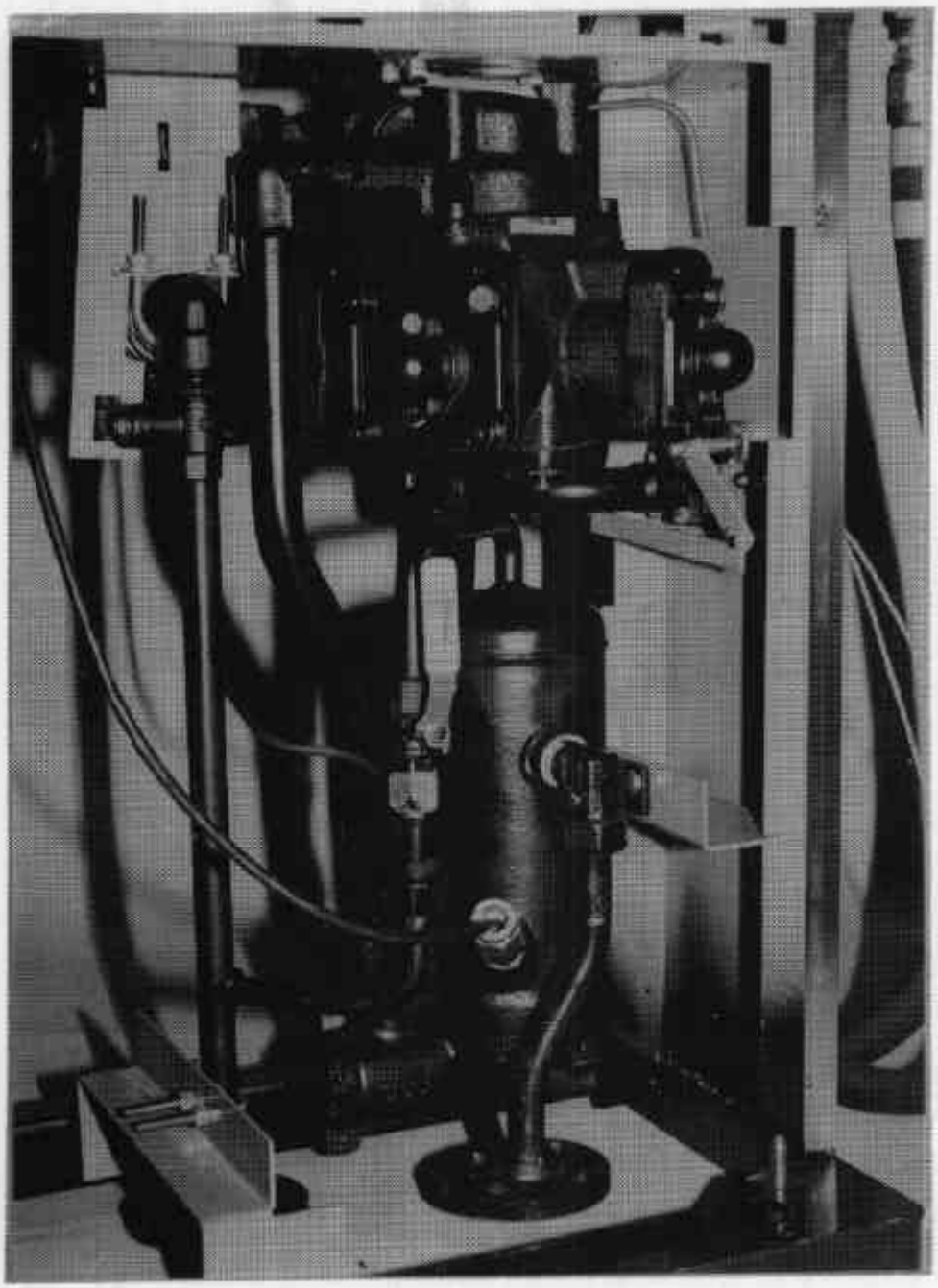
26/9/83

FIGURE P10/1/8 - 2

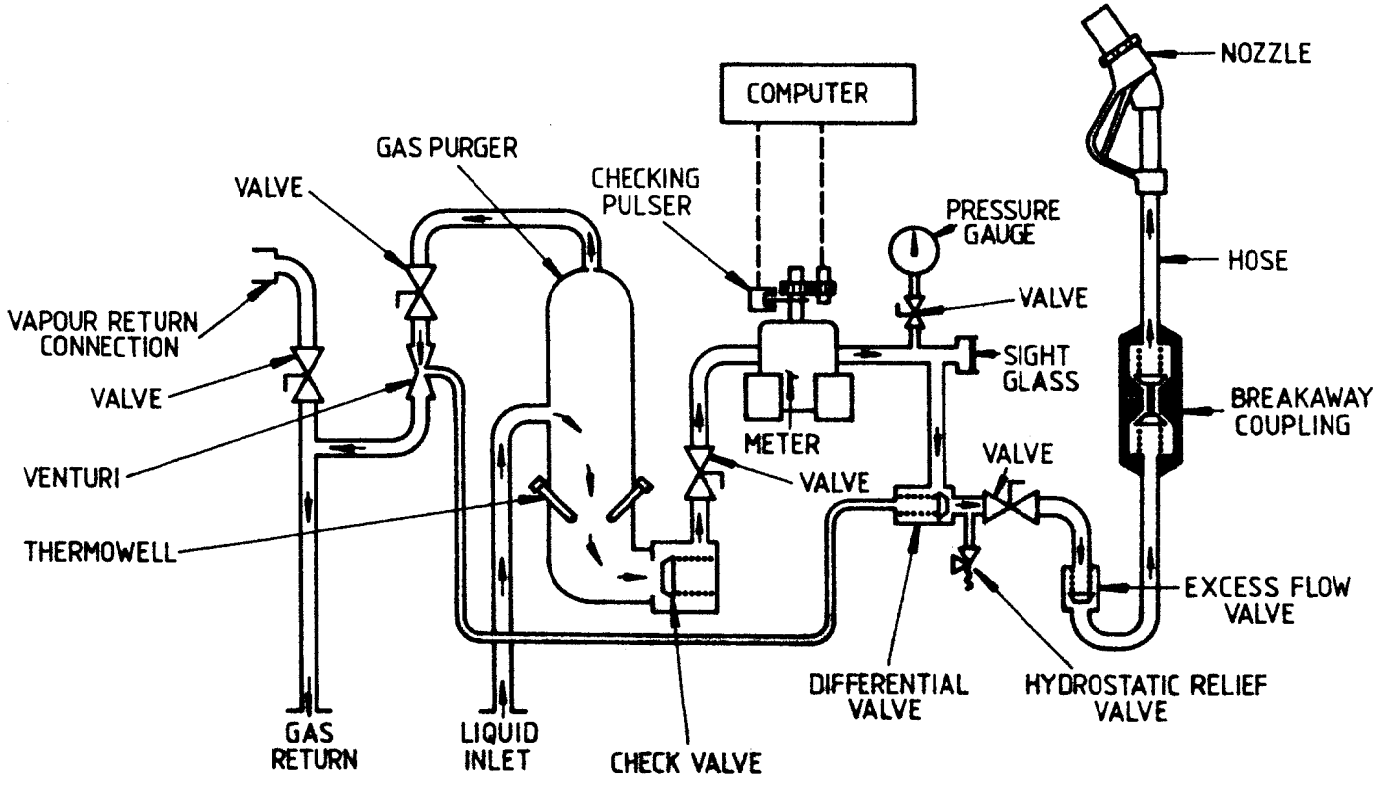


Model T093D With Covers Removed (View A)

26/9/83



Model T093D With Covers Removed (View B)



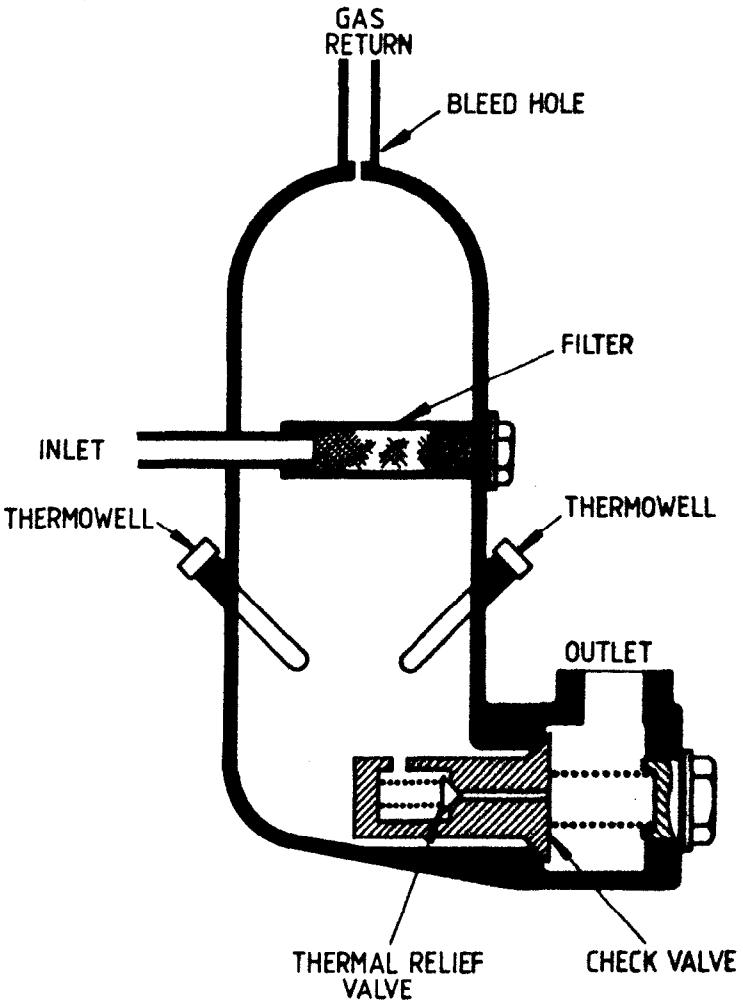
Model T093D Hydraulic Diagram

FIGURE P10/1/8 - 5

Meter:	Silea type Lux 60 4-piston meter (707-1174-M) complete with Silea continuous-bleed gas purger.
Computer:	Gilbarco Electroline CD module including indicator (DT03185) and electronic temperature compensator.
Nozzle:	Gilbarco model 102-ZVG 1.3, also known as an Elaflex.
Excess Flow Valve:	3/4" NPT - REGO A3272G.
Hydrostatic Relief Valve:	Silea part number 707-1248-M - 2400 kPa.
Vapour Indicator:	Silea in line sight glass flow indicator.
Delivery Hose:	Standard commercial hose approved for LPG, 19 mm nominal bore. Model T093B also has a hose mast.
Ball Valves:	Cast iron, steel or bronze construction - standard commercial product approved for LPG.

Component Table For Gilbarco Models T093D And T093B

FIGURE P10/1/8 - 6



Gas Purger